Claims

1. A method of sputtering a thin film comprising the steps of:

installing a target containing first and second elements in a sputtering chamber, the first element having a higher atomic weight than the second element;

placing a substrate with a conductive surface in electric contact with at least a first electrode;

generating a plasma containing positive ions of first and second elements; and

differentially re-sputtering the first element by applying a first electric potential to the first electrode to form a nonuniform electric field along the conductive surface to deposit the thin film with variations in an atomic percentage of the first element along the conductive surface.

2. The method of claim 1 wherein the substrate is a disk having a central hole and the first electrode contacts the conductive surface at an outer diameter and the nonuniform electric field varies monotonically along radial lines on the conductive surface of the disk.

3. The method of claim 1 wherein the first element is platinum, the second element is cobalt and the substrate is a disk.

4. The method of claim 3 wherein the first electrode contacts the disk around a circumference of the disk.

5. The method claim 4 wherein the nonuniform electric field varies according to radial position on the disk and the variation in the atomic percentage of platinum is along radial lines on the disk.

6. The method of claim 5 wherein the atomic percentage of platinum is lowest at the circumference of the disk.

7. The method of claim 2 wherein the thin film is magnetic and has a coercivity gradient along radial lines on the disk.

8. The method of claim 7 wherein the coercivity is lowest at a circumference of the disk.

9. The method claim 1 further comprising the steps of placing the conductive surface in electric contact with a second electrode; and applying a second electric potential to the second electrode, the second electric potential being different from the first electric potential.

10. The method claim 9 further comprising the steps of placing the conductive surface in electric contact with a third electrode; and applying a third electric potential to the third electrode, the third electric potential being different from the first and second electric potentials.

11. The method claim 1 further comprising the steps of placing the conductive surface in electric contact with a plurality of electrodes arranged in a pattern and applying nonuniform electric potentials to the plurality of electrodes to modulate the electric field distribution across the disk surface to produce a pattern in the variations in an atomic percentage of the first element along the conductive surface.

12. The method claim 11 wherein the plurality of electrodes are arranged in a concentric array.

13. The method claim 11 wherein the atomic percentage of the first element varies circumferentially.

14. The method claim 13 wherein the variations in an atomic percentage of the first element form servo islands which are distributed circumferentially.

15. An article of manufacture comprising:

a substrate; and

a thin film on a surface of the substrate including at least first and second elements with an atomic percentage of the first element varying systematically along lines on the surface.

16. The article of claim 15 wherein the substrate is a disk, the first element is platinum, the second element is cobalt, the thin film is magnetic and the atomic percentage of platinum varies according to radial position on the surface.

17. The article of claim 16 wherein the magnetic thin film has a coercivity which varies according to radial position on the surface.

18. The article of claim 16 wherein the atomic percentage of platinum is lowest at a circumference of the disk.

19. The article of claim 16 wherein the atomic percentage of platinum is highest at a circumference of the disk.

20. The article of claim 15 wherein the substrate is a disk and the atomic percentage of the first element is equal in concentric bands on the disk forming a pattern.

21. The article of claim 15 wherein the substrate is a disk and the atomic percentage of the first element varies circumferentially.

22. The article of claim 15 wherein the substrate is a disk, the thin film is magnetic and the variations in an atomic percentage of the first element form servo islands which are distributed circumferentially.

23. A disk drive comprising:

a magnetic transducer including a read and a write head;

a spindle; and

a magnetic thin film disk mounted on the spindle, the magnetic thin film disk including cobalt and platinum, and the magnetic thin film having a systematic pattern of variation in an atomic percentage of platinum.

24. The disk drive of claim 23 wherein the magnetic thin film has a radial gradient in coercivity corresponding to the radial gradient in the atomic percentage of platinum.

25. The disk drive of claim 23 wherein the atomic percentage of platinum is lowest at a circumference of the disk.

26. The disk drive of claim 23 wherein the atomic percentage of platinum is highest at a circumference of the disk.

27. The disk drive of claim 23 wherein the atomic percentage of platinum is equal in concentric bands on the disk forming a pattern.

28. The disk drive of claim 23 wherein the atomic percentage of platinum varies circumferentially.

29. The disk drive of claim 23 wherein the variations in an atomic percentage of platinum form servo islands which are distributed circumferentially.

30. A method of sputtering a thin film comprising the steps of:

installing a target containing first and second elements in a sputtering chamber, the first element having a higher atomic weight than the second element;

generating a plasma containing positive ions of first and second elements; and

placing a substrate in electric contact with at least a first electrode;

differentially re-sputtering the first element by applying a RF electric potential to the first electrode to form a nonuniform electric field along a surface of the substrate to deposit the thin film with variations in an atomic percentage of the first element along the surface.

31. The method of claim 30 wherein the substrate is a disk having a central hole and the first electrode contacts the conductive surface at an outer diameter.

32. The method of claim 30 wherein the first element is platinum, the second element is cobalt and the substrate is a disk.

33. The method claim 32 wherein the nonuniform electric field varies according to radial position on the disk and the variation in the atomic percentage of platinum is along radial lines on the disk.

34. The method of claim 32 wherein the thin film is magnetic and has a coercivity gradient along radial lines on the disk.

35. The method of claim 32 wherein the substrate is a disk, the nonuniform electric field varies along radial lines on the disk, the variation in the atomic percentage of the first element is along the radial lines, the thin film is magnetic and has a variation in coercivity corresponding to the variation in the atomic percentage of the first element.

36. The method of claim 30 wherein the substrate is a disk and the atomic percentage of the first element is equal in concentric bands on the disk forming a pattern.

37. The method of claim 30 wherein the substrate is a disk and the atomic percentage of the first element varies circumferentially.

38. The method of claim 30 wherein the substrate is a disk, the thin film is magnetic and the variations in an atomic percentage of the first element form servo islands which are distributed circumferentially.